THE UNIVERSITY OF WASHINGTON

Arboretum bulletin

SPRING 1966

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THE UNIVERSITY OF WASHINGTON

Arboretum bulletin

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COVER PHOTO:

Flowering Branch of *Eurya japonica*

PHOTO BY: WILLIAM ENG

The Arboretum As A Classroom

Paul Hoerlein*

The Science Department of the Seattle Public Schools has long been interested in developing a program of study that would incorporate some of the educational features of the University of Washington Arboretum. With this in mind a professional class for teachers was presented last year as part of the in-service training offered by the Seattle Public Schools. This class on the use of the Arboretum was conducted by John Putnam, Science Assistant. Paul Hoerlein, Principal of J. J. McGilvra Elementary School, attended the classes and with the help of Mr. Putnam developed plans for a series of field trips to be taken by the fifth grade classes at McGilvra during the school year of 1965-66.

The closeness of the school to the Arboretum makes it possible for the youngsters to have repeated opportunities to observe the changing relationships between the living organisms and their environment. This ecological point of view can best be understood if a community is studied over a period of time. Thus the series of field trips is extending throughout the year to observe the effect of seasonal change on a forest community.

Preparation for the initial trip in early fall included a classroom discussion of the skills scientists need, the best way to distinguish differences and similarities in forest life, and the kinds of activities that should follow careful observations. Then the class viewed and discussed a film on "The Temperate Deciduous Forest" which introduced them to a basic vocabulary to use in their explorations and reports.

During the introductory field trip the class was acquainted with the area to be studied throughout the year and the students were encouraged to ask questions. Small groups of students made general observations and recorded data on sky conditions. Emphasis was placed on conserving the field in as natural a state as possible during the observation period.

After this initial trip the students returned to school and met to compile a list of questions about their experiences to be used as a base for future study. Such queries as, "Why do some trees lose their leaves rapidly and others over a long period of time?", "Why is ground cover more abundant in one location than in another?", and "Why is the temperature of the soil higher near a large tree than out in the open?", were natural outgrowths of the field trip observations.

Since September, groups have made monthly trips to the Arboretum. The first task was to establish the specific area to be studied since by closely confining this area students may draw more accurate inferences. For example, a scientist would not study all the plants in a field. He would choose an area and then look for certain things within it. By correlating his findings with those of other investigators, they could draw inferences based on their work. With this in mind, the class established a line 100 feet long that incorporated features of a typical forest community. It is on this line and in the area to either side of it that the observations have been made.

These probably can be listed under the general headings of physical factors, plants, and animals. Within the physical factors group come observations on the general terrain, measuring temperature and light, and collection of soil samples. As the students become familiar with the area a land map and a land profile are drawn on which they place the major land features and the plant distribution. The temperature and light meter readings are charted to show the effect of seasonal change. The soil is examined and tested for acid content, com-

*Mr. Hoerlein is principal of the J. J. McGilvra Elementary School.

pactness, and ability to hold water. By comparing weights of soil samples wet and dry, water content of the various soil levels may be determined.

The study of the plants in the area is related to the physical factors as the plant distribution is marked on the profile. From study of the types and frequency of plant growth the students begin to see the relations within the plant community. Litter trays collect leaf fall from the trees and shrubs and provide evidence of how trees contribute to the build-up of the soil and how natural seeding takes place. Plant identification is a natural out-growth of this study.

To children accustomed to studying animal life in the form of large mammals, the Arboretum presents a change of pace. The profile does not readily offer evidence of animal life. The ever-present squirrels and birds are there, but more intensive investigations must take place to reveal the tiny animals living in litter, soil, or on plants in the area. One technique that has been successful is to prepare a microorganism funnel. Soil samples from various levels are placed in funnels and allowed to dry out slowly. The tiny, almost microscopic, animals are driven down by the drying action and forced to fall into a solution where they are preserved for study.

It should be made clear that the approach that is being attempted in this work in the Arboretum is one of discovery. The goal is not the teaching of a great deal of factual information but rather an introduction to the process of investigation. Hopefully the skills and procedures learned in this program would make the student a better observer of his environment. Much of the science being taught in our schools today is based on the theory that the best learning takes place when the student is involved in a process of discovery meaningful to him.

Group of Students in the Arboretum.

Fig. 1 Photo by: Commercial Photography, Royal C. Crooks

Seattle Plant Science Exhibit

Mrs. Pendleton Miller*

It seems that we who live in the State of Washington are the only ones who refer to this geographical area as the "Northwest." For some unknown reason, Northern California and Southern Oregon typify the Northwest to the majority population of the United States. This is obviously a sensitive point with us.

Here in Washington State there is a greater range in climate and greater range in diversity of plant species and animal life, within a smaller area, than anywhere else in the United States. From the deserts of Eastern Washington, through the arid and fertile grasslands and plains, up over the alpine Cascade crest, down into the Puget Sound Basin, and over to the rain forests of the mighty Olympics' western slopes, there is a bit of everything that is to be found in a temperate region. This is plant ecology on a grand scale, all within a few hundred miles.

The above introduction serves to explain the inspiration for the following action. Looking about for a "good deed" public relations-wise for the Seattle Garden Club, I approached the officials of the Seattle Center on the merits of a display area to exhibit both photographic and live ornamental plant material from the University of Washington Arboretum. This was also to include colored slides of the Japanese Tea Garden run on a projectograph, Arboretum brochures for tourists, and pertinent information concerning the Arboretum. The project met with their enthusiastic approval and they designated an area 15 by 30 feet in size for this purpose on a demonstration basis, provided that the Seattle Garden Club assume all expenses and maintenance. This was done with the cooperation of the Arboretum Foundation Educational Committee. The necessary wall and table coverings were contributed by Mr. Frederick E. Davis.

That project proved to be so successful I then consulted Dr. Dixy Lee Ray, Director of the Pacific Science Center (within the Seattle Center and constructed under a grant from the Federal Government) about a permanent plant science exhibit that could be appropriately added to the Science Exhibit area. Dr. Ray agreed wholeheartedly with the idea. I then approached the Dean of the College of Forestry of the University of Washington (Gordon D. Marckworth, Dean Emeritus), the Director of the Arboretum (Mr. Brian O. Mulligan), and the Chairman of the Arboretum Foundation Educational Committee (Mrs. David Metheny), and found them most receptive to this project.

In pursuing the development of this exhibit a committee was then made up of scientists: the Associate Dean of the University of Washington College of Forestry, Dr. Stanley P. Gessel, and Professor C. Frank Brockman; the Chairman of the Department of Botany, Dr. Richard B. Walker; the Assistant Director of the Arboretum, Mr. Joseph A. Witt, and Mrs. Joseph A. Witt, to work with the University of Washington Foundation Education Committee. Not enough credit can be given to this committee for the time and effort they gave which extended over the period of a year in completing this study. All-important financial support for this permanent exhibit came from a grant of $26,000 provided by the Weyerhaeuser Company Foundation. The Arboretum group then merged with scientists, foresters and technicians from the Weyerhaeuser Company and the Science Center to formulate the actual design. The result was a comprehensive plant science exhibit on the elementary school level portraying the complex factors

*Certainly Mrs. Miller was the driving force behind this fine civic project.

behind our broad range of plant life.

It comprises several basic units that illustrate the close interrelationships between geographical location, land topography, climate and plant growth. Centrally and strategically placed on a platform (15 x 9 feet) is a large relief map (6 x 9 feet) of the State. An animated diagram directly above the map explains the hows and whys of our climate's behavior and coincides with the taped commentary which is given over individual telephones located at the foot of the map. Together these provide the general background for the rest of the exhibit.

A large photomural standing 16 feet wide and 12 feet high shows a typical northwest coastal scene against which huge trunk sections of six important forest trees are set off. These are also a study in contrasting bark characteristics. In addition to this, and opposite the platform, there are six panels (5 x 8 feet), one for each of the six major life zones. These individual exhibits are illustrated by color photographs and transparencies, and demonstrate the key to the elevations and to the locations relevant to prevailing winds. These form the backbone of the entire exhibit.

The reasons for the wide differences in climate and indigenous plant material make an interesting story. Prevailing winds over the Pacific Ocean sweep toward the mainland laden with moisture, then rise quickly, as they are forced upward by the seaward slope of the Olympic mountains. In rising, the warm air cools and much of its moisture precipitates as rain in the lowlands or snow at higher elevations. The effect is so marked that rainfall (up to 140 inches per year) in some western valleys of the Olympic Peninsula encourages growth of the most luxuriant temperate forests (appropriately called "rain forests") found anywhere on earth.

Just as the ocean influences precipitation, so it affects seasonal temperatures. In effect, the ocean is a great air conditioner. The result is that winds reaching land, after crossing the sea, differ little in temperature between summer and winter. As this oceanic air stream sweeps inland from the Olympic Mountains, we see it drop into the Puget Sound basin, and then begin to rise again as it meets the western flank of the Cascade Range.

In the lowlands, although the moist air often creates cloudy conditions, rainfall is not excessive, and as the air is forced upward by mountains for the second time, it is cooled again and still more moisture wrung out. Heavy rains on the mountain slopes support great forests extending right up to where it becomes too cold for trees to grow (the timberline). At these higher levels, most of the remaining airborne moisture is precipitated as snow, so that when the air finally crosses into the eastern portion of the State, it is almost dry. Still farther east, the oceanic influence is almost completely absent and the continental climate prevails; summers are hot and winters cold as the result of air heated or cooled over the vast expanse of north and central Canada. The rains that occur are often associated with thunder storms and long periods pass when appreciable rainfall is completely lacking.

In the far eastern part of the State however, the land begins to rise again and here more generous moisture nourishes the rich grasslands of the Palouse.

The story of Washington's climate makes the exhibit more meaningful as one visits the colorful displays illustrating plant and animal life associated with each distinct climatic zone.

Two important criteria guide the development of all exhibits at the Pacific Science Center. First, they must be scientifically accurate, esthetically pleasing, interesting and informative to the general public; second, they must be useful in the teaching of science. This project, to which so many contributed their time and talents, has met these criteria.

This is a permanent exhibit. It not only has considerable merit in educating the elementary school level children to an appre-

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Scenes in the Arboretum, II

Loderi Valley

J. A. Witt

A number of factors have combined to give the Arboretum the degree of success it enjoys. Planning in the early stages as well as that done concurrent with its growth has, of course, been a major item; the weather that enables us to grow such a broad spectrum of plans is another; the dedicated staff, both past and present, and the sympathetic help received from the University and the Arboretum Foundation all contribute to make the Arboretum what it is now. Another, and major feature perhaps overlooked by the casual visitor, is the varied terrain that is the physical body of the Arboretum. Rising gently from the marshy areas at the lake level to an elevation of about 150 feet near the holly collection, the topography could best be described as rolling. This diversity naturally adds to the visual interest, and at the same time creates suitable sites for specimens which have some particular planting requirement. The element of surprise can be exploited effectively in such ground, and Loderi Valley is an excellent example.

Traveling along Arboretum Drive E. immediately south of Woodland Garden you are not aware that a small hidden valley lies just a few yards away unless you are tempted to walk down the most northerly of a pair of service roads that join the Drive there. A few steps past the entrance and you find yourself looking over a shallow bowl bounded by a ridge to the north and east, a slope to the south, and more or less open to the southwest but screened from Azalea Way by native trees and shrubs supplemented by introduced specimens. One's first impression of this area will depend on the season in which it is viewed, but a second impression, that of tranquility and seclusion will be almost certain to follow. This sense of isolation is caused in part by the overstory of large old native trees—Douglas fir, hemlock and large-leaf maple predominate—and in part by the arrangement of beds planted with screens of tall rhododendrons and bordered by grassy walks that curve temptingly out of sight inviting one to follow them.

Naturally, Loderi Valley is more than tall trees and greenery. It in fact contains some of the best of the Arboretum's hybrid rhododendrons, a very good collection of magnolia species, large beds of azaleas and a wide selection of other plants, many of which are shade and moisture loving.

April to early June is the period of maximum flowering there and would be an excellent time for you to visit this "hidden valley".

The plantings are so planned that from the time the earliest magnolias open their flowers one group of plants will follow another in a long sequence of blossoms. The magnolias are first; at present it is the star magnolia seedlings, *M. stellata*, near the eastern edge of the Valley, but as time goes on such treasures as *M. Dawsoniana* (a large tree of this species has set flower buds for the first time this winter), *M. Sargentiana* 'Robusta' and *M.* 'Charles Raffill' will be earlier. As yet most are too young to flower. The saucer magnolias, *M. Soulangiana*, follow, putting out their rose-mauve cups in mid-April. Two fine clones 'Alexandrina' and 'Burgundy' have made especially good trees. Young plants of the Arboretum's own *M. Kobus* 'Wada's Memory' are also beginning to make a fine display near the lower center of the Valley.

UPPER—Loderi Valley after clearing operations, March 1949.
Fig. 2 Photo by: E. F. Marten

LOWER—Loderi Valley in late April 1958.
Fig. 3 Photo by: E. F. Marten

Long before the last magnolia blossoms fade, the rhododendrons start their annual show. Several large plants of that fine *R. Thomsonii* hybrid, *R. Luscombei*, can be expected to open their rosy-red bells in mid-April. They are followed then by the magnificent *R. Loderi* clones and seedlings that give this area its name. The largest single grouping of clones is that of *R. Loderi* 'King George' in a bed near the west center of the valley. These plants are at least 8 ft. tall and can be expected to carry the huge trusses of fragrant white flowers in profusion each year. Other *R. Loderi* clones are found growing in beds on both sides of the service road that transects the valley. There are mature specimens of 'Pink Diamond', 'Venus', 'White Diamond' and others planted in 1950 in various beds along this road. Some of these do not flower reliably, however, an outstanding group that never fails is the *Loderi* seedlings. These form the backbone of all the plantings in the valley. These were raised from seed donated by Mr. Herbert G. Ihrig in 1941 and are now 10-12 feet tall. During their flowering period of about three weeks, from early to late May, they demonstrate what variation will occur from hybrid seed. The best are worthy of clonal names. One, 'Mrs. A. F. McEwan', has been registered. Taken en masse they are one of the Arboretum's most effective plantings.

As the season progresses other rhododendron groups and individuals come into flower. Especially attractive is the large plant of 'Pilgrim' on the south bank and a small planting of the brilliant red 'Vulcan' which brightens a shady area near the center of the valley.

Near the western end of Loderi Valley where there is more open sky you will find

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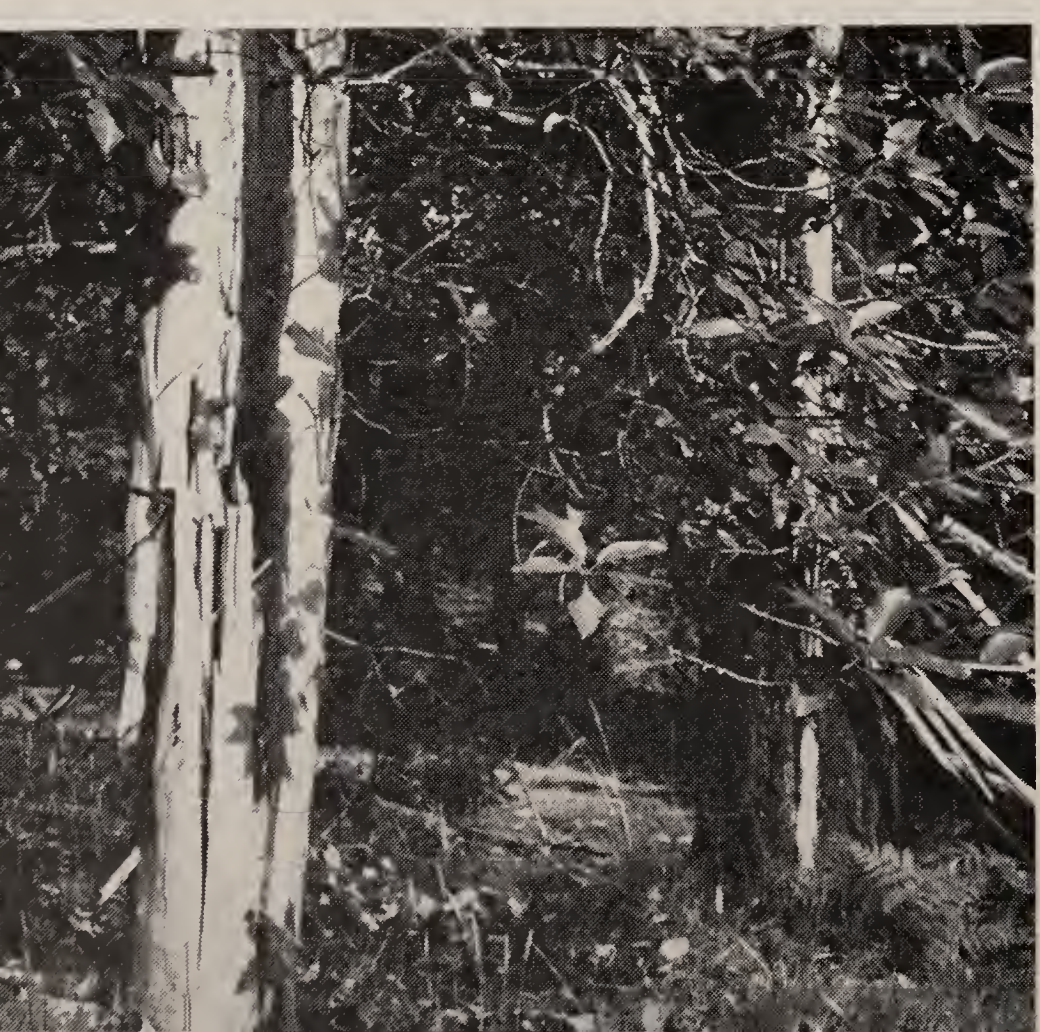
Lightning Strike in Arboretum

On the night of July 25, 1965 a rare event occurred in the Arboretum. An electric storm which developed over Seattle produced a flash of lightning which struck one of our taller Douglas fir trees, 120 ft. high. The charge passed down the fir, cutting a narrow sliver of bark out of the trunk in a long gradual spiral from the west side near the top to the east side at the base. It also transferred some of its power to an adjacent young madrona tree (*Arbutus Menziesii*), perhaps 25 ft. tall, of which a few branches touched the fir, with the result that the trunk of the madrona was split into fragments, apparently from the center outwards. The photograph (fig. 4) shows the effect on both trees, which were removed next day.



Electric storms are uncommon in Seattle, averaging about six per year, according to Weather Bureau records. The striking of a tree in the Arboretum seldom happens, and particularly two at one time.

B. O. M.

Madrona tree struck by lightning, from Douglas fir in rear. July, 1965.

Fig. 4 Photo by: B. O. Mulligan

Research in the University of Washington Department of Botany

Richard B. Walker*

This is the second of three articles on biological research currently being conducted at the University of Washington. Biological research in the College of Pharmacy will follow in a later issue.

During the period 1905 to 1940 the relatively small staff conducted substantial research in a number of areas:—notably algal morphology, peat bog ecology and classification of the higher fungi, Bryophytes and higher plants. Currently, these areas of research are still receiving attention, but the considerably increased faculty and graduate student group have diverse interests which extend as well into many other botanical areas.

Marine Botany

Quite naturally in our salt water location studies of marine algae have continued and, in fact, rapidly expanded. In the water of the San Juan Islands and other areas of Puget Sound studies continue in the larger seaweeds. In spite of sixty years of active research on these plants, there are still considerable areas in which the algal flora is unknown and, in addition to the actual recognition of the seaweeds, much work is needed investigating their reproduction, growth, and life histories. Very helpful in the latter types of studies has been the advent during recent years of SCUBA diving techniques. The Department has a small cruiser specifically designed for such activities.

Certain aspects of the growth and reproduction of the seaweeds cannot be effectively studied in the natural environment. In order to pursue some of these phases, in the past two years about 50 species of these algae have been isolated into artificial solution cultures. Controlled environment facilities have been developed for this culturing and for experimenting with the plants being so grown. Experiments with some of them have demonstrated the external control, especially by light, of some growth and reproductive activities.

Along with the study of the larger algae, active investigations are under way on the phytoplankton, those microscopic but nonetheless very important members of marine food chains. Special aspects of these studies involve the make-up of the cells, their nutrition, and life histories. Many of these are being grown for extended periods in artificial culture solutions. Species under study come not only from our own area but from the Indian Ocean and northeastern Pacific as well.

Also included in marine activities are some interesting physiolgical studies in the stored carbohydrate food materials of the algae. Chemical studies have been carried out on the nature of the starch and starch-like stored foods of the red algae, the Euglenoids, and other algae. Further, studies of the ecological aspects of feeding by invertebrate animals on algal material have been included. The latter has involved the study of the breakdown of the stored algal foods by enzymes derived from sea urchins, chitins, crabs, crayfish, etc.

Classification of Northwest Plants

Work in the classification of non-vascular plants, long a specialty of this Department, is continuing. Work is particularly active in the descriptions of new species of lichens and mosses. A Moss Flora of the State of Washington and a Lichen Flora of Washington are in preparation. (Information on

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*Professor, and Chairman of the Department

the fungi is included in the next section.)

A major effort has been under way during the past 15 years in the classification of vascular plants of the Pacific Northwest. These studies are being published in a 5-volume *"Flora of the Vascular Plants of the Pacific Northwest."* Four volumes of this important work have already appeared, carrying classification from the willows up through the sunflower family. In preparation at the present time, is the fifth volume, which will include ferns, conifers, and monocotyledonous seed plants. Certain aspects of plant distribution will also be covered in this volume. It is scheduled for publication in 1967.

Work is in progress as well with respect to improved methods of plant classification. Although of necessity most classifications must be done on the basis of appearance, interesting additional information can be obtained in terms of ability or inability to hybridize. In fact, basic definitions of species usually include genetic or hereditary compatibility within populations of *the same* species and the lack of such compatibility *between* species. The species of a number of genera native to western North America (e.g. *Silene, Streptanthus*) are being tested for genetic compatibility in a hybridization program. Basically, it uses the techniques of the plant breeder and the traditional methods of plant classification. In some cases, interesting confirmation of the traditional classifications has been obtained by hybridization; that is, the species recognized by the traditional method seem to be incompatible with other species. In other instances, infertility between species is not absolute and the obtained degree of fertility ranging from low to reasonably high give clues as to the range of relationship of the species.

Fungi

Although often of interest as food plants or sources of drugs, the fungi of the Pacific Northwest are still very imperfectly known. An active program is underway in the Department in the collection and classification of several groups of the fleshy fungi (especially *Clavaria, Rhodophyllus, Dasyscyphus,* and *Inocybe*). In the genus *Hydnum,* a comparative study of certain of the metabolic products is involved in a project being supervised jointly by this Department and the Department of Pharmocognosy (College of Pharmacy).

Fungi are frequently found growing on arthropods, other insects, crustacea, millipeds, etc. The associattion between these fungi (e.g. species of the genus Amoebidium) and their hosts is very complex. It appears that the development of a fungus may be synchronized with the life history of the animal. The way in which these organisms live together is being studied from the standpoint of both psysiological and developmental aspects. This includes observations in the field and experimental approaches in the laboratory.

Physiology of Vascular Plants

The Arum lilies (*Arum, Sauromatum,* et al) are peculiar in that the appendix of their inflorescences produces substantial amounts of heat during the first day of flowering. The biological function of this heating is probably the evaporation of the unpleasant smell that attracts pollinating carrion flies and beetles. The biological control of this spectacular increase in the metabolic activity of the tissue is the subject of an interesting study in the Department. The enzymatic processes involved in the cellular oxidation and the identity of the volatile "smell" constituents (ammonia and a large number of amines) have been investigated so far. More recently, the discovery has been made that the upsurge in metabolism of the appendix is triggered by an exposure to light for several hours. A sufficiently long light exposure after a period of darkness leads to a metabolic flare-up after a lag time of about 20 hours. Work is continuing with respect to the most effective wavelengths of the light and the site in the flowers where the stimulus is received.

A quite different study, but one also in-

volving metabolism, has been carried out on the enzymes derived from several species of mosses. In particular, the unusual enzyme oxalic acid oxidase has been isolated from a number of mosses.

A further program in the physiology of plants concerns growth and development. This program is concentrated on the problem of the mechanism by which the hormone auxin controls cell elongation. By special techniques, it has been possible to show that the auxin "loosens" the cell wall, enabling it to expand more readily. Work of a similar nature involves study of elastic and plastic extensibility of the cell wall. Also work is continuing in the chemistry of the wall "loosening". The possibility exists that a particular collagen-like protein becomes bound in the wall as an essential part of the "loosening" process.

In close collaboration with the College of Forestry, a program involving study of the physiology of forest tree species has been carried on for a number of years. Most of the earlier work was concerned with the mineral nutrition of western red cedar, Sitka spruce, and Douglas fir. Currently, a study of the mineral nutrition of the red alder is in progress. Attention is being given also to the water relationships of coniferous species, especially to Douglas fir. In the latter study, the photosynthetic rates of the plants are being measured under varying conditions of water stress. At the same time, measurements are made of the water status of the needles and a determination of whether the stomata are open or closed is made. These studies are being closely coordinated with studies on the same species at Pack Forest.

The physiology of an unusual group of plants, the serpentine endemic species (see last section) is also under study. In particular, we have been interested in the calcium and magnesium requirements of these plants which grow naturally on soil very high in magnesium. It is now clear that the plants have an unusually high requirement for magnesium and an especially avid ability to absorb calcium.

Plant Anatomy

Knowledge of the structure of plants is important in enabling us to understand aspects such as development of organs, functions of tissues, resistance of mechanical injury or disease organisms, reproductive mechanisms, and the like. Research in the Department in the area of plant structure has been devoted primarily to the anatomy of shoot tips, with special attention to delayed development of lateral buds. Further studies have involved the senescence of shoots which go on to the production of thorns.

Very recently, an electron microscope has been acquired and installed in the Department. The impact of this new tool on the research of the Department is yet to come, but certainly this will have a very beneficial effect in several areas. It is well adapted to studies in plant anatomy.

Ecology and Plant Distribution in Relation to Soil Types

Although climate is of primary importance in controlling plant distribution, the mineral content and physical nature of parent rock may account for much of the regional localization of plant species. One extreme geological occurence which has produced spectacular effects in vegetation is that of the special ultrabasic rocks high in magnesium called serpentine. Many serpentine areas exist in western North America, particularly in the area ranging from central California to the Siskiyous of southern Oregon. Current research in this Department, however, has been on some unusual outcrops of serpentine and related rocks in the State of Washington. The particular study area has been in the rugged ridge and mountain valley country between Mount Stuart and the Teanaway River. Among the plants growing in this area it has been possible to recognize a group of endemics, that is, plants which appear to be restricted to this type of soil. A second

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Noble Fir

Abies procera Rehd.

C. Frank Brockman*

This handsome conifer is the most interesting but, to most people, the least known of the four true firs indigenous to the State of Washington. Its common name gives one a clue to its interest and to one unfamiliar with the forest flora of the Pacific Northwest the initial discovery of this species will be a memorable experience. To make such a discovery one has to journey to the higher slopes of the Cascades for both the geographical as well as altitudinal range of the noble fir is quite limited; this fact probably accounts for the average person's limited knowledge of this species. It may be encountered as low as 2,000 feet but is most abundant and most generally observed near the upper limits of the Canadian zone, between elevations of 3,500 and 5,000 feet. Although it occurs in association with various tree species more typical of both lower and higher elevations, its more common companions in the altitudinal range noted are the Alaska-cedar (*Chamaecyparis nootkatensis*) and western white pine (*Pinus monticola*).

Driving along a highway flanked by steep mountain slopes one will first become aware of the noble fir among other conifers by the distinctive bluish tinge of its foliage which contrasts with the more yellow-green color of foliage of other species. Closer inspection will reveal a number of other features useful for identification. Like all true firs the needles are sessile at the base, that is they are not narrowed into a

*Another of Prof. Brockman's interesting tree series.

stem or petiole, and when they drop or are removed from the branch they leave a conspicuous round, depressed leaf scar. In addition the needles, often plump to 4-sided in cross section, as well as flattened, are marked by silvery lines or bands of stomates on all surfaces. Further, the foliage on upper branches of the crown is generally crowded toward the upper side. These features readily distinguish the noble fir from two true firs found at lower levels—Pacific silver fir (*Abies amabilis*) and grand fir (*Abies grandis*). These latter species possess stomatiferous bands only on the lower surface of the needles; in addition, needles on the upper branches are not crowded in the upper side. However, noble fir is occasionally associated with subalpine fir (*Abies lasiocarpa*) at the altitudinal borderline between the upper Canadian and lower Hudsonian zones. In such instances recognition becomes more difficult. Foliage of these two species is somewhat similar in that both bear stomates on all surfaces. A clear-cut case of identity is often dependent upon observation of the cones which are quite dissimilar. In fact the cones of noble fir are among the most distinctive of American true firs. As in all true firs they stand upright on the branches and disintegrate at maturity, but their most noteworthy characteristics are their size, shape, and the presence of unique bracts. Columnar in form, they may vary from 4 to 6 inches long and between 2 and 3 inches in diameter. The purplish scales are overlaid with long, exserted, greenish-brown bracts, so numerous that they overlap like shingles on a roof. Thus, in effect, these cones have a brownish, "bristly" appearance quite distinct from the smaller cones of subalpine fir, as well as from other conifers encountered in this region (fig. 5).

The bark of mature noble firs also offers a fairly reliable means of identification,

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Cones of the Noble Fir *Abies procera*
Fig. 5 Photo by: William Eng

Kamuela (Sam) Stevens

In the *Bulletin* for Spring 1962 we noted the retirement of L. J. Michaud as nursery foreman and the appointment of Kamuela Stevens as his successor.

It is with sorrow and a real sense of loss that we now have to record the sudden and unexpected death of the latter on February 6, just four years after starting work in the Arboretum. This was long enough, however, for all of us on the staff to appreciate the extent of his horticultural knowledge and practical experience, which he constantly put to good use in his daily tasks, most notably in the transplanting of larger specimen shrubs or trees.

He was not one to stand by and watch others do the hard manual labor, but was often to be found helping to dig plants in the nursery, or sharing in their planting elsewhere. Two of the last operations in which he played a major part were the moving of a collection of Japanese cherry trees from a nursery near Salem, Oregon, planting the majority behind the south pond on Azalea Way, and the transfer of three 9-12 ft. tall specimens of *Crytomeria japonica* from an Everett, Washington, nursery to the south approach to our Japanese garden. These will form an excellent memorial to one who loved the Arboretum and did his best towards its improvement. We shall miss him.

B.O.M.

Arbor Day

Gordon D. Marckworth*

Man's interest in trees is almost as old as man himself. Trees have afforded both food and shelter and in the early days had religious significance.

Just when the planting of trees began is difficult to determine. In Germany there were sporadic attempts at sowing and planting as early as the beginning of the 14th century. However, extensive artificial reforestration did not begin until the middle of the 18th century, although planting was required by law on cutover areas as early as 1598. In 1700 in Saxony planting was carried out in connection with certain events, especially to celebrate the marriage day. In Prussia in 1719 the bridegroom had to prove that he had planted a certain number of oak and fruit trees before he could be married.

In Japan, arbor days were instituted in the 18th century. These were memorial days, such as the birth of children, which were marked by the planting of trees.

In Spain, since 1896 arbor days have been used as a means of educating the public and various associations have fostered the idea. In 1904, La Fiesta del Arbol was made a holiday and awards were given for plantations made on that day. Likewise, in Italy in 1902 Arbor Day was introduced as an educational feature.

In this country trees have had a different appeal, and one which has changed from time to time.

When the colonists first came to this country they brought with them a reverence for trees and an interest in their preservation. It was soon found, however, that trees were abundant beyond all expectations and that they interfered with the building of homes and the raising of crops.

When the settlers began to move into the prairie section of the midwest, an interest in the planting of trees developed. It was felt that trees had an effect on climate and particularly, when properly planted, would decrease the drying effect of wind, would furnish fuel, and would provide habitats for birds and small animals.

In Nebraska Mr. J. Sterling Morton, who was a member of the State Board of Agriculture, became interested in the planting of trees and suggested that a special day be set aside for that purpose. He presented a resolution to the Board, which was unanamously adopted and which stated "that Wednesday the 10th of April, 1872, be and the same, is hereby set apart and consecrated for tree planting in the State of Nebraska, and the State Board of Agriculture hereby name it Arbor Day; and to urge upon the people of the State the vital importance of tree planting, hereby offer a special premium of $100 to the Agriculture Society of that county in Nebraska which shall, upon that day, plant properly the largest number of trees; and a farm library of $25 worth of books to that person who, on that date, shall plant properly in Nebraska the greatest number of trees."

The result of the adoption of this resolution was that over a million trees were planted in Nebraska on that first Arbor Day. Annually thereafter Governors of Nebraska issued proclamations designating April 10 as Arbor Day. In 1885 the legislature designated April 22, the birthday of Mr. Morton, as the date of Arbor Day and made it one of the State's legal holidays.

While Mr. Morton was a newspaper publisher, he was also one of Nebraska's distinguished citizens. He served as a member of the Territorial Legislature in 1856 and 1857 and served as Acting Governor for several months in 1858. In 1858 President Buchanan appointed him as Secretary of the Territory, a position he held until 1861. From 1893 to 1897 he served in President Cleveland's Cabinet as Secretary of

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*Dean Emeritus, College of Forestry and Editor ABORETUM BULLETIN.

Agriculture.

The success of the Arbor Day tree planting venture in Nebraska encouraged the Horticulture Society of Iowa to undertake a similar program in the same year. This was followed by programs in Kansas and Tennessee in 1875, and by North Dakota and Ohio in 1882.

In 1882 a national five day forestry meeting, the first American Forestry Congress, was held in Cincinnati, and through this meeting Arbor Day gained a new significance. Part of the program was a parade from downtown Cincinnati to Eden Park, one of the city's larger parks. There trees were planted in memory of distinguished men. School children and teachers formed a conspicuous part of the parade and planting program. This enlistment of the school children in the planting of trees expanded to other states and soon the planting of trees by school children on Arbor Day became a national custom. In 1883 the American Forestry Congress passed a resolution endorsing the celebration of Arbor Day by schools, and several educational associations, including the National Education Association did likewise. These tied the Arbor Day program more closely to the planting of trees by school children.

From a beginning in the State of Nebras-

(Continued on Page 24)

Orchard Trees as Garden Subjects

MARGE BAIRD*

To me, the essence of spring is the flowering of the old orchard around our "Victorian" farm-house. It was planted in the 1890's and though most of it has been left to its own devices the past 25 years it continues to surprise me with its abundance of flowers and fruit. Of course, there is also an abundance of codling moths, aphis, "green worms", and caterpillars, but these bring a great number of bird species.

Each variety of tree has its own pleasing character and parades in the same order every year. First come the pears—like prim Pilgrim ladies in their starchy raiment; then the prunes, Geisha girls in black and white kimonos; next, the cherries, those gay blowzy bar-maids. The apples follow—pink-cheeked milkmaids with, now and then, a swirling skirt tucked high on one side.

I have wondered, of late, why we can't use some of these lovely trees in our gardens. They give us the added bonus of fruit without any more care than the ornamental cherry, crab apple or plum. For the smaller garden a quince, plum or Italian prune would be ideal. Pears may be a bit larger but seem quite insect resistant. Pie cherries are attractive but you must vie with the birds for their fruit. The same is true of the sweet cherries. They need much more room and seem to dislike heavy clay soil. Peaches and apricots prefer the porous soils of eastern Washington. We have, however, a "Pacific Gold" peach which bears every year and is over 30 years old. A great variety of apples do well here. Unfortunately some of the interesting old-fashioned ones are "out of style", (who knows where I can find an "Early Harvest"?), but consult your nurseryman.

All but the earliest apples must have a calyx spray in the spring so that when you bite into the luscious fruit you won't find *half* a worm! But beyond this, they are no more bother than most ornamental trees.

Although they are good associates for our broad-leaved evergreen shrubs, may I suggest planting one in a lawn area. This not only makes it accessible for pruning, spraying and picking but most important of all, it furnishes a child with unexcelled climbing material without the dismembering of the rhododendrons.

*Mrs. (Hugh) Baird member of the BULLETIN Editorial Board.

The Bog Ecological Microcosm

Louis W. Messmer*

Few natural areas have the unique appeal of an undisturbed peat bog. This is not the appeal of the lush jungle nor the hardwood forest. It is the appeal of the dune area, the desert scene, or the montane scree. The typical Western Washington bog comes in a small, complete package. Each bog possesses a series of plant successions, from open water to surrounding forest. The individual plants that make up these successions become more interesting as we come to know them better.

We can learn to appreciate the beautifully precise adaptations of these bog plants even though the experts are still discovering new mechanisms that enable them to survive and prosper in a hard-bitten, inhospitable environment. Certain conditions can be found in all peat bogs. These are: poor drainage, acid soil and water, and low fertility. Bogs are created when vegetation accumulates in a depression under acid conditions that slow decay. This accumulation in turn creates more acidity. The acidity makes certain minerals almost unavailable. As the vegetation accumulates even a large lake can become a shallow bog, and finally the bog fills with peaty soil, becomes drained and might even support a forest. Thus we can see that though a bog may be hundreds of years old, it is but a fleeting stage in a larger process. This article is written with the hope that northwesterners will come to know and appreciate our natural bogs and perhaps be stimulated to try some "ecological gardening" of a different sort.

The "scree", or "rock garden" enthusiast knows the satisfaction of creating one of these microcosms. Bog gardening would require that the gardener learn to do things that are not done in most other types of gardening. Poor drainage, for instance, must be provided. The soil must not be "sweetened". Fertility must be kept low to discourage other plants.

The following lists include some of the common bog plants in this area, with some notes of interest.

Submerged, or partly submerged plants.	
Nuphar, Yellow Pond Lily	
Brasenia, Water shield	Small, purplish waterlily resembles cultivated forms
Menyanthes, Buckbean	Shiny, trifoliate leaves; clusters of attractive white flowers
Lysichitum, Skunk Cabbage	Calla-like
Utricularia, Bladderwort	Submerged, traps small crustaceans in bladders
Hummock-formers or dwellers	
Sphagnum, peat moss	The living base for most of the bog. Holds twenty times its weight in water
Sedges	
Drosera, Sundew	Traps insects on sticky leaves, probably to supplement mineral-deficient "diet"
Vaccinium oxycoccus, Cranberry	Sparse creeper, produces edible berries
Myrica gale, Sweet gale	Aromatic leaves, deciduous
Kalmia, Bog Laurel	Rhododendron-like flowers with inserted anthers than "dust" insects with pollen
Ledum Labrador Tea	Clusters of white flowers. Interesting rolled leaves rusty beneath

*Mr. Messmer is Chairman of the Biology Department, Gray's Harbor College.

"Understory" plants beneath shrubs	
Cornus candensis, Bunchberry	Miniature dogwood, excellent
Struthiopteris, Deer fern	
Gentiana, Bog gentian	Late blooming, tall
Trees and tall shrubs	
Myrica californica, wax myrtle	Evergreen, purplish waxy fruits. Excellent shrub
Pinus contorta, beach pine	Becomes pleasingly dwarfed in bogs
Taxus brevifolia, western yew	Sparse, but interesting small tree
Spiraea douglasii	Pink to rose flowers; forms dense colonies

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The Gray's Harbor College Arboretum

ESTHER BERRY*

OUR good seed has fallen upon fertile soil! A new arboretum is about to come into being at the Gray's Harbor Junior College in Aberdeen, Washington. It demonstrates, in a very real sense, the way in which the University of Washington Arboretum serves the people in all parts of this state. To a large extent this new arboretum has been inspired and modeled after the arboretum here. Its organizational structure is similar to that in use here and it is further indebted to this arboretum for propagating wood and seed and especially for the helpful advice of both Mr. Mulligan and Mr. Witt.

The director of the Gray's Harbor College Arboretum is Mr. Louis Mesmer, who heads the biology department of the college. Mr. Mesmer is a graduate of the School of Botany of the University of Washington. He will be assisted by the Gray's Harbor Arboretum Society which will function in much the same manner as the Arboretum Foundation does.

This group embarks upon this program without financial backing, indeed without any resource but their own enthusiasm and a willingness to work together to make this contribution to the cultural life of the college and the community. They have the support of several garden clubs in the area and of the Gray's Harbor Chapter of the American Rhododendron Society which has assumed responsibility for all Rhododendron plantings.

Plans for the arboretum include both a collection of ornamental plants and forest

*Mrs. (Robert) Berry member of the BULLETIN Editorial Board.

trees which will be useful in the study of dendrology. In addition, it is possible that the geographical location of the arboretum may permit the cultivation of some plants which may not be hardy in other parts of the state. Surely some experimentation with plants of marginal hardiness seems worthwhile.

The entire college site which is presently about twelve acres will be included in this program. The campus proper occupies about five acres and is located in the side of a rather steep slope which faces north and east. At the base of this slope lies a beautiful little lake. This wooded slope and the areas adjacent to the lake would be the main areas devoted entirely to plantings. The college has recently acquired an additional eighty acres so there will be space for future expansion.

The actual planting must, of course, be delayed until a landscape plan is completed and the soil properly prepared. In the meantime other work is going forward. A heated propagating frame has been constructed and is already well stocked with rooted cuttings of *Arctostaphylos, Ceanothus, Ilex* and *Camellias.* It also contains many Rhododendron species grown from seed. Materials have been assembled for the building of nursery beds and work parties are scheduled to get these ready for use this spring. Educational courses in practical gardening now are being planned for members of the Arboretum Society.

THE HEATHER SOCIETY YEAR BOOK, 1965 (Sussex, England) carries a most interesting article "Comments by an American Heather Grower", Dorothy Metheny, Seattle, Washington, U.S.A. Mrs. (David) Metheny is certainly one of the foremost authorities on Heather and its culture in the Pacific Northwest.

Some of Our Favorites ☆

☆ *Won't You Send Us Yours?*

Helleborus Foetidus

Helleborus Foetidus is a pleasant, unassuming plant that I find very valuable. It is the least showy of any of the hellebores grown in the Seattle area. But the plant itself, without bloom, contributes its quota of charm. *Helleborus foetidus* is an herbaceous perennial twelve to fifteen inches high and perhaps a little broader. The dark green leaves are palmately divided, the segments are narrow. By the time the flowers appear in January or February, the stems will have lengthened to an additional six to twelve inches. These upper stems and the bloom are a brighter chartreuse color. Some of the sepals (the petals aren't showy) will be narrowly bordered with reddish purple. These blooms remain attractive and brighten the garden until the seed is about to drop in late May or June.

Helleborus foetidus is lovely if planted singly where its leaf pattern shows to great advantage. Put one where it can be seen from the house during the winter. It also makes an excellent groundcover. The contrasting dark green foliage and lighter green inflorescence is interesting in a large mass.

My favorite use for this hellebore is as a temporary shrub. It will grow faster than most of the small shrubs used in a new border and so will fill the gaps until the shrubs take over. Then I just pull out the hellebores. After all, there are always lots of smaller seedlings coming on and they can be used for the next landscaping project. There will be more seedlings than wanted. These go to friends or to the Arboretum plant sale.

Always plant hellebores in their permanent locations while small. Larger plants resent moving and will often sulk for a year or more. If wanted for flower arranging, the foliage requires no special pre-treat-

ment. The flowers will hold up well if they are cut a day before needed and plunged to their necks in cold water and kept cold over night. Any additional cutting of the stem should be done under water.

I suppose it only fair to mention that the specific name 'foetidus' means stinking. However it is no more smelly than other green-flowered species and then one doesn't notice the odor unless pruning or otherwise bruising the plants.

Dorothy Brauss

Findings of the City Council Pursuant to Hearing under Resolution 20187, concerning the R. H. Thompson Expressway between East Calhoun N *East Aloha St.; dated Oct. 7 1965.*

"The City owned property comprising the Arboretum has, pursuant to the "Arboretum Agreement" authorized by Ordinance 65310, for thirty years been developed under the supervision of the Board of Regents of the University of Washington through donations of material and labor, and expenditures of University funds, plus private contributions, into one of world-wide reputation and is now used by the University and other institutions of higher learning as a laboratory for research, also by public school districts for outdoor classroom instruction and extensively by the public as an area for passive recreation.

The University of Washington Arboretum is a vital and irreplaceable teaching and research adjunct to the University of Washington. The University of Washington Arboretum provides an irreplaceable recreational and open space amenity to the people of the City of Seattle in its central area."

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The Arboretum Bulletin

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Snow Damage, December, 1965

We tend to have our weather catastrophies on or near holidays it would seem. The deep cold that swept into this area in 1955 started on Armistice Day; the typhoon in 1962 is still known as the Columbus Day storm; and now we may add the Christmas snow of 1965.

A wet snow started to fall on Thursday, December 23 and continued more or less throughout the Christmas weekend. It didn't reach any great depth on the ground since the air temperaure was just above freezing, but the snow did pile up on plants. The Arboretum's crew shook it off some of the camellias and rhododendrons but couldn't cover more than a very small area. On returning from the long week end we were appalled by the amount of damage that had occurred. Numerous trees had been actually pulled over by the weight of the snow, including a large catalpa growing near the bridge over Lake Washington Blvd. The worst damage, however, was to the native vine maples, *Acer circinatum*; over fifty clumps had stems of various sizes broken down so they had to be removed. Some of these stems were five to six inches in diameter. In many clumps nearly all the large limbs were ruined, leaving only whip-like smaller branches.

Along Azalea Way the large Bush's oak, *Quercus Bushii,* lost most of its top and one very large branch. The tree is for all intents and purposes a total loss, although it will be saved for a time. Fortunately we have young plants of this interesting and handsome hybrid, propagated several years ago. Several of the winter cherries, *Prunas subhirtella* 'Autumnalis', also on Azalea Way, were broken down as were many eastern dogwoods, *Cornus florida.*

The snow wrenched down massive limbs from the native firs and hemlocks, in fact, the ground was nearly as littered with

fallen debris as it was after the Columbus Day storm.

Perhaps due to the efforts of the crew, the broadleaved evergreens didn't suffer to the same extent. There were a number of split stems and torn branches on the camellias and one large rhododendron pulled out of the ground. It seemed that the major damage was confined to the deciduous trees and shrubs.

I wonder what's in store for us on Washington's Birthday? J.A.W.

Noble Fir

(*Continued from Page 13*)

particularly when this species occurs in association with Alaska-cedar and western white pine between the 3,500 and 5,000 foot elevations. It is dark gray to black, often tinged with purple, and broken into numerous small rectangular blocks about two inches long. Bark of mature western white pine has a lighter gray hue and that of Alaska-cedar is "shaggy" in appearance, being composed of elongated scales which are loose at the ends.

The noble fir, discovered by David Douglas in 1825 near the Columbia River, occurs principally in the Cascades of Washington and Oregon. Unlike most true firs its wood has value for general construction purposes so considerable of the original supply has been logged. The commercial value of its wood also probably accounts for the fact that loggers and woodsmen often refer to it as "larch". As a general rule noble fir occurs singly or in small groups in cooler, moister soils of upper mountain slopes and although larger specimens are occasionally found it normally grows to a height of 100 to 150 feet and a diameter of 2 to 4 feet.

This is your Arboretum, kept alive by your support

We are pleased to welcome the following new members (September 1, 1965 through January 31, 1966) *Sustaining*—Kenneth F. Fales, Hawthorne Hills Garden Club, Elaine Kaiding, Mrs. Richard Lea, Miss Wilma Nelson, Mrs. Harold K. Oswold, Lucille Rissue, Ridgecrest Garden Club, Mr. & Mrs. Allen C. Schwartzman, Seattle Rose Society, Edward Watanabe. *Annual*—Mrs. W. A. Adams, Mrs. James Addington, Mr. & Mrs. S. A. Attri, Mrs. Wm. A. Bain, Mrs. Brian H. Barker, Mrs. Richard Barndt, Mrs. Paul W. Bielfeldt, Mrs. Wm. N. Bonallo, Mrs. Charles E. Bradner, E. C. Brockenbrough, M.D., Mrs. Lyle C. Burwell, Mrs. A. J. Bush, Mrs. Robert W. Campbell, Mrs. Gordon Carlson, Mrs. David Clarke, Mrs. James A. Curry, Jr., Mrs. Stephen M. Davis, George F. Doczi, Mrs. J. C. Donoghue, Mrs. John Dontos, Mrs. John E. Erickson, Mrs. J. M. Gallanar, Mrs. Vince Galvin, Mrs. Donald J. Gardiner, Mrs. Leon P. Gardner, Mrs. J. D. Guthrie, Mrs. Glen Haggen, Mrs. Warren G. Hannah, Mrs. W. P. Hartje, Mrs. Leonard Helland, Mrs. Robert Helton, Mrs. Fred D. Hill, Mrs. John C. Hill, Robert Hitchman, Donald A. Howe, Mrs. Jack E. Jones, Mrs. Glen Juel, Mrs. Donald Jurgich, Mrs. Karl H. Kaye, Mrs. Carol Kelling, Mrs. Wm. Kelso, Mrs. Peter Kennedy, Mrs. R. H. Kenyon, Mrs. Jack E. Kittell, Mrs. Clarence Klopfenstein, Mrs. John Lapinski, Mrs. Robert Lawler, Mrs. James D. Layman, Mrs. Edward LeCocq, Mrs. Norma Lewis, Mr. & Mrs. Russell Lukens, Mrs. Clyde MacDonald, Mrs. B. E. McFarland, Mrs. J. R. McFarling, Mrs. Alvin Meyersahm, Mrs. N. P. Michel, Mrs. H. Russell Miller, Montana State University, Mr. & Mrs. Robert D. Mooney, Mrs. Hal W. Morrill, Miss Lucile Munzer, Mrs. D. W. Mussen, Mrs. Theodore C. Nark, Jr., Mrs. Lynn Netherton, Mrs. Richard A. Neve, Mrs. Bjarne F. Ove, Mrs. M. L. Redfern, Mrs. Albert H. Reed, Mrs. Cappy R. Ricks, Mary Alice Romano, Cyrus E. Rubin, Mrs. Anton Rydland, Sasaki, Dawson, Demay Associates, Inc., Mrs. Arthur L. Schultz, Mrs. Arthur L. Seabury, Mrs. Raymond C. Seeley, Robert M. Shields, Mr. & Mrs. Richard I. Sindell, Robert E. Small, Mrs. Horton Smith, Mrs. T. D. Smith, Mrs. James L. Suddarth, Mrs. H. S. Tusler, Miss Mary Waldron, Mr. & Mrs. Gregory Wellnitz, Mrs. Kenneth Williams, Dr. & Mrs. Kenneth R. Wilske, Donna L. Wolter, Mrs. J. C. Worthington, Martin A. Wright, Mrs. Wm. W. Wurts, Miss Dorothy A. Young.

We are also grateful to the following members who have increased their dues to: *Contributing*—Mrs. Florence Putney. *Sustaining*—Mrs. H. E. McCray, Mrs. Louis Toppano.

BOOK REVIEWS

Plant Drugs that Changed the World, by Norman Taylor (drawings by Margret Cosgrove). Dodd, Mead & Co., NYC; 1965. $5.00.

This book will be of particular interest to pharmacists and doctors of medicine. However, botanists and others interested in plants may also find it worth reading. It presents, in interesting and readable fashion, the origin of drugs of world-wide acceptance which are derived from plants. Some, like cascara, refer to plants familiar to people of the Pacific Northwest but in most cases the reader is introduced to a variety of interesting information which reaches back through history and introduces one to practices of primitive people in remote corners of the globe.

The drug garden of the College of Pharmacy on the University of Washington campus will certainly have greater interest after browsing through the various chapters of this book.

C. FRANK BROCKMAN

A Gallery of Flowers by Germain Bazin. Appleton-Century Publisher, New York, $8.95.

This book will fascinate lovers of beautiful pictures and choice prose. The author, Germain Bazin, is the chief curator of the Louvre. He says, "This book is an attempt to connect the history of flower painting with that of the flowers themselves, in so far as they have been grown in Europe or imported into Europe. The choice of flowers made by the painters depends, in fact, on fashion, and so it is also part of the history of taste." In **A Gallery of Flowers** he tells how flowers have influenced men's lives since the beginning; the rivalry and high prices brought by the bulbs of tulips (£ 150 each!) and crown imperials, and the societies formed in England featuring primulas. He tells of the symbolism acquired by the rose and the lily. Then he presents forty-five exquisite color plates which reproduce the flowers found in European paintings from the end of the fourteenth century to the present. Germain Bazin names the flowers in the pictures, giving not only the common names but also the Latin ones.

In short, this is a book that "must-be-owned" by flower lovers everywhere.

JEAN WILCOX

Tall Trees and Far Horizons by Virginia S. Eifert, 301 pp. Illus. Dodd, Mead & Co., New York. 1965. $5.00.

It is difficult to realize that the many thousands of plants found growing on the American continent when the first settlers arrived were unnamed and, in fact, unknown. Every blade of grass, every flower, every shrub and every tree had to be "discovered," classified and named. Here was a botanist's paradise—a thrilling challenge and a virgin field. Here he could make a real contribution to the knowledge of the plant world and to his own education.

Any book describing such discoveries would of necessity tell about the individuals involved, their interests, their frustrations and their accomplishments. This Mrs. Eifert has done, and in so doing has written a selective biographical sketch of each scientist. She has also described the contribution each has made, and the trials and tribulations they have faced. These pioneer naturalists in their explorations encountered countless hazards—hazards which often endangered their lives, such as lack of food, illness, severe climate and hostile Indians.

Among the naturalists included in the book, and their contributions, are Thomas Hariot; Carl Linnaeus, and his new system of naming plants; John Bartram, and the first botanical garden in America; Jane Colden, the first American woman botanist; Peter Kalm; Andre' Michaux, and the Spanish conspiracy; Thomas Nuttall; David Douglas; Lewis and Clark and their famous plant collection; Amiel Weeks Whipple, and the petrified forest in Arizona; Frederick Vandeveer Hayden, and the Teton-Yellowstone wilderness; Leo Lesquereux, and his fossil plants; Henry David Thoreau; John Muir and many others.

Anyone who loves plants and/or adventure will find this book most interesting and instructive.

GORDON D. MARCKWORTH

The Gardener's Fern Book by F. Gordon Foster. Van Nostrand. $7.95.

Of late there has been such widespread interest in ferns that it is surprising that we have so little popular literature dealing with the genus. Mr. Foster's book is therefore especially welcome. He writes from a wide knowledge of native ferns of northeastern United States and also considerable experience with tender ferns for indoor culture. It is obvious that he writes from this personal experience rather than a coordination of the experiences of others. In addition he is also a skilled photographer. He has combined these attributes to make a fine book. One only regrets that its scope does not include many of the ornamental ferns native to the northwest.

Although written mainly for gardeners living in the northeastern part of the United States, the sections about planning, planting and cultivation would be useful anywhere. The chapters dealing with identification and propagation are particularly good for they convey the fundamental facts without being too technical.

His suggestions for the use of ferns in the garden, in the woodland, and in rock work make extremely interesting reading, giving one new ideas for the use of ferns one already has and a keen desire to acquire still others. The suggestion that the culti-

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vation of these plants in our gardens may be the only sure way to save this heritage for future generations to enjoy, is well taken.

Over half the book is devoted to the description and identification of 40 hardy ferns and 27 tender kinds. This part will be of great interest to all who grow ferns for it not only gives a complete description but each fern is illustrated with superb line drawings showing silhouettes of the entire leaf and enlarged sketches of the diagnostic features. It is, of course, invaluable for reference.

I'm sure that the use of common names in the text is intended to make it clearer and simpler for amateurs but I found it somewhat confusing since some of these names refer to quite different plants in different localities.

Altogether this is a very useful book; its enthusiastic and knowledgeable presentation will assist those who are already growing ferns and encourage others to make a beginning.

ESTHER BERRY

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Seattle Plant Science Exhibit

(Continued from Page 5)

ciation of the Pacific Northwest, but having this exhibit in Seattle will be particularly worthwhile and informative during the World Botanical Congress which is to be held in Seattle in 1969.

Arbor Day

(Continued from Page 15)

ka, the celebration of Arbor Day has spread to every state in the Union and to many foreign countries. In the United States the date may be set by the legislature or it may be by proclamation of the Governor. Because of differences in climate, the celebration is held on different dates in different sections of the country. Generally it is held in April or May, however, in the southern states it is often held in the winter months—December through February. Some states celebrate Arbor Day on two days—one in the autumn and one in the spring. In the State of Washington the date of Arbor Day was set by the Legislature in 1957 as the second Wednesday of April.

The year in which Arbor Day was first celebrated in the State of Washington is not clear. In a bulletin of the Department of Agriculture published in 1896, entitled "Arbor Day: Its History and Observance", the date of first observance in Washington is given as 1892. In subsequent publications 1894 is given as the beginning date.

A superb small Rhododendron species for the rock garden is *R. pemakoense* which often flowers so freely in April that the leaves can hardly be seen. The flower color ranges from a silvery lilac to a strong pink, the height from six inches to two feet.

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Research in the University of Washington Department of Botany

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group of plants have populations which occur both on and off the serpentine, yet greenhouse studies have revealed that the populations differ genetically even though they look much alike. A third group of plants, representing a very large number, do not grow at all in the serpentine habitat. A variety of field, laboratory and greenhouse studies are being directed toward discovering the differences which exist between these three groups of plants just mntioned.

Summary

It should be apparent in the foregoing discussion that the faculty and graduate students of the Department of Botany have a considerable diversity of interests and activities. Often the results obtained in experimentation with one plant or group of plants can be used with success in predicting the behavior of plants in general. Although much of the work may at this stage appear to be theoretical, we are constantly alert to possible applications to practical botany and ornamental horticulture. Further, the imprint of our particular environment, the varied plant materials and habitats of western Washington, is clearly embodied in our work. Questions concerning specific details of any aspects of the work and visits to the Department to view phases of special interest are much in order. Arrangements for such visits or obtaining of further information can be done through a telephone call to 543-1942.

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Loderi Valley

(Continued from Page 8)

a notable planting of deciduous azaleas. They are largely native American species such as *Rhododendron canescens, R. nudiflorum* and *R. occidentale.* The best of the lot, however, is the well established planting of *R. calendulaceum,* the Flame azalea, with flowers of glowing crimson to yellow, in June.

Early summer finds the flowering that started in April near an end, although *Rhododendron Bakeri,* a deciduous azalea from the southeastern United States carries its brighest orange blooms at this time on the northeast bank. In the summer months, however, the valley is largely a place of greens as the many foliage plants take over. *Gunnera manicata,* with its giant leaves, various rhubarb (*Rheum*) species, hostas, the large planting of *Epimedium* at the eastern entrance are only a few of the plants grown more for leaf shape and texture than for beauty of flower. All seem to thrive under the conditions found in Loderi Valley and add a high degree of summer interest to that area. Whatever the season, be it April for magnolias, May for rhododendrons, June for azaleas, July for foliage texture and form, or any month for a few minutes in a secluded area of quiet peace, try hidden Loderi Valley,—you won't be disappointed.

International Dendrology Society

At a meeting of the Council of this Society held in London, England, June 15, 1965, the Director of the Arboretum was elected a member of the Council, of which Dr. Donald Wyman, Horticulturist at the Arnold Arboretum, Boston, Mass., is already a member.

The objectives of this Society are "to promote the study and cultivation of woody plants and for this purpose to bring together persons and bodies interested in these objects all over the world."

The President of the I.D.S. is the Duke of Abercorn, Co. Tyrone, Ireland. The Secretary is Miss H. Hazelton, c/o *Amateur Gardening,* 2-10 Tavistock St., Covent Garden, London, W.C.2., England.

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